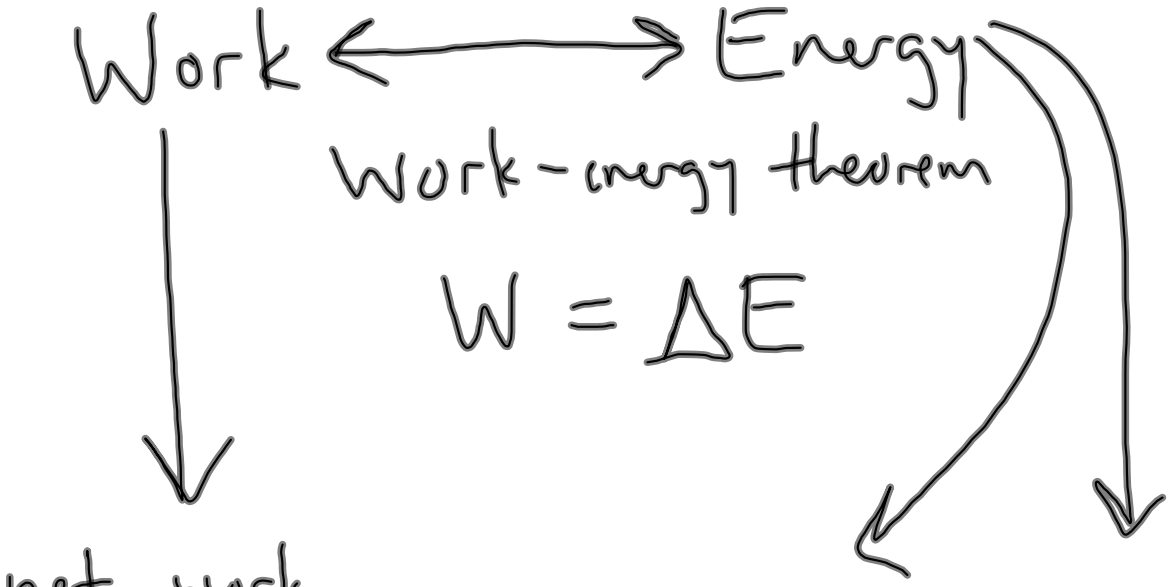


net work
individual work

$F d \cos\theta$

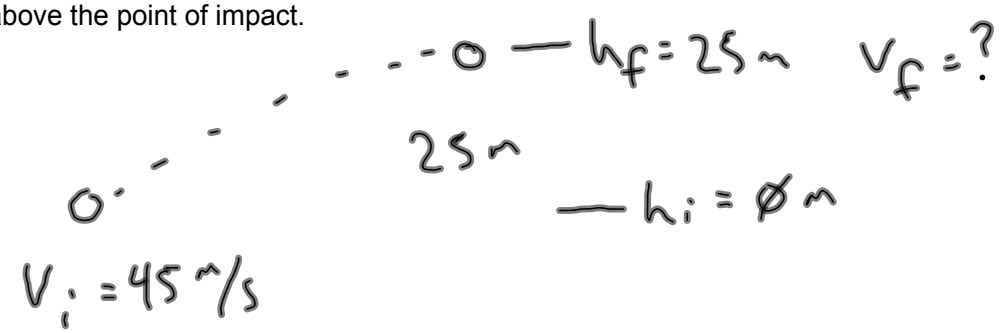
Kinetic
$\frac{1}{2}mv^2$

Gravitational Potential
mgh

- If the problem mentions work, force, and/or displacement, we are most likely going to use work-energy theorem.

- If there is mention of work or forces, use conservation of energy.

A pitcher throws a 0.14 kg baseball, and it approaches the bat at a speed of 45 m/s. The bat does 70 J of non-conservative work on the ball as they are in contact. Ignoring air resistance, determine the velocity of the ball after the ball leaves the bat and is 25 m above the point of impact.



$m = 0.14\,kg \quad W = 70\,J$

$$W = \Delta E$$

$$= (K_f - K_i) + (U_{gf} - U_{gi})$$

$$W = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 + mgh_f$$

$$v_f = \sqrt{\frac{2}{m}\left(W + \frac{1}{2}mv_i^2 - mgh_f\right)}$$

$$= 50.3\,m/s$$

Efficiency:

$$Eff = \left(\frac{E_f}{E_i}\right) 100\%$$

$$= \left(\frac{U_{gf(big)} + U_{gf(tennis)}}{U_{gi(big)} + U_{gi(tennis)}}\right) 100\%$$